

CLAIMS

1. A method of printing a coding pattern to code data in a first dimension on a surface, the coding pattern comprising a plurality of first parallel number sequences which represent different rotations of a first cyclic number sequence, said method comprising:
 - retrieving a digital representation of the coding pattern;
 - identifying said rotations in said digital representation to derive first shift information which designates a phase difference between each rotation and the first cyclic number sequence;
 - generating a first data structure in which each of said rotations is represented by said first shift information and first definition data which represents said first cyclic number sequence;
 - transferring the first data structure to a printer; and
 - bringing the printer to convert the first data structure into a printable image.
2. A method of claim 1, wherein said first definition data comprises a first image definition which represents said first cyclic number sequence by at least one code block image.
3. A method of claim 2, wherein each number value in said first cyclic number sequence is represented in said at least one code block image by at least one code symbol, said step of bringing comprising: bringing the printer to retrieve, for each rotation as represented in the first data structure, said at least one code block image, and to merge the thus-retrieved code block images, based upon said first shift information, to form a first composite image.
4. A method of any one of claims 1-3, wherein the coding pattern is printed to also code data in a second dimension on said surface, the coding pattern comprising

a plurality of second parallel number sequences which represent different rotations of a second cyclic number sequence, said method comprising:

5 identifying said rotations of the second cyclic number sequence in said digital representation to derive second shift information which designates a phase difference between each such rotation and the second cyclic number sequence;

10 generating a second data structure in which each of said rotations is represented by said second shift information and second definition data which represents said second cyclic number sequence;

transferring the second data structure to the printer; and

15 bringing the printer to convert the first and second data structures into a printable image.

5. A method of claim 4, wherein said second definition data comprises a second image definition which represents said second cyclic number sequence by at least one code block image.

20 6. A method of claim 5, wherein each number value in said second cyclic number sequence is represented in said at least one code block image by at least one code symbol, said step of bringing comprising: bringing the printer to retrieve, for each rotation as represented in the second data structure, said at least one code block image, and to merge the thus-retrieved code block images to form a second composite image.

25 7. A method of claim 6, wherein the step of bringing comprises: bringing the printer to combine said first and second composite images.

30 8. A method of claim 6 or 7, wherein each code symbol codes one number value in the first cyclic number sequence and one number value in the second cyclic number sequence, said step of bringing comprising: in each code block image, representing each number in the first and second cyclic number sequences, respectively, by a

graphic superposition of all code symbols that code the value of said number.

9. A method of claim 8, wherein said step of bringing comprises: bringing said printer to align said first
5 and second composite images, determine the AND logic values of mutually aligned image elements in said first and second composite images to obtain a two-dimensional matrix of AND logic values, and form said printable image from said two-dimensional matrix.

10 10. A method of any one of claims 6-9, wherein each unique combination of a number value in the first cyclic number sequence and a number value in the second cyclic number sequence is represented by a predetermined, discriminable graphical state of said code symbol.

15 11. A method of claim 10, wherein each code symbol comprises a code mark and an associated spatial reference point, wherein said states are represented by characteristics selected from the group consisting of:

20 a magnitude of displacement of said code mark with respect to its associated spatial reference point;

a direction of displacement of said code mark with respect to its associated spatial reference point;

a shape of said code mark;

a size of said code mark;

25 a color of said code mark;

and any combination thereof.

12. A method of claims 9 and 11, wherein said step of bringing said printer to align comprises: bringing said printer to align said spatial reference points.

30 13. A method of any one of claims 4-12, wherein the first and second cyclic number sequences are identical.

14. A method of any one of the preceding claims, wherein at least one of said first and second dimensions code at least one absolute position.

35 15. A method of any one of the preceding claims, wherein said first and second dimensions code at least one absolute position.

16. A method of claim 15, wherein said first and second dimensions code absolute positions in a two-dimensional coordinate system.

17. A method of any one of the preceding claims,
5 wherein said step of bringing includes transferring a page-describing code to said printer for execution therein.

18. A method of claim 17, wherein said step of generating includes incorporating said data structure in the
10 page-describing code.

19. A method of claim 2 or 5, wherein said image definition is a font definition.

20. A method of claim 19, wherein said font definition defines a bitmap font.

21. A method of claims 1 and 4, wherein said first and second definition data comprises first and second data items that each represent one number value in said first and second number sequences, respectively; said step of bringing comprising: bringing said printer to
15 combine, according to a given combination operation, a first data item in said first definition data with a spatially corresponding data item of said second definition data.

22. A method of claim 21, wherein each of the data
25 items defines an image of at least one code symbol that represents said one number value.

23. A method of claim 21, wherein each of the data items comprises an identifier of said one number value.

24. A computer program comprising program instructions for causing a computer to perform the method according to any one of claims 1-23.
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25. A computer program of claim 24, embodied on a record medium.

26. A computer program according to claim 24, stored
35 in a computer memory.

27. A computer program according to claim 24, embodied in a read-only memory.

28. A computer program according to claim 24, carried on an electrical carrier signal.

29. An apparatus for printing a coding pattern to code data in a first dimension on a surface, the coding pattern comprising a plurality of first parallel number sequences which represent different rotations of a first cyclic number sequence, said apparatus comprising:

means for retrieving a digital representation of the coding pattern;

10 means for identifying said rotations in said digital representation to derive first shift information which designates a phase difference between each rotation and the first cyclic number sequence;

means for generating a first data structure in which 15 each of said rotations is represented by said first shift information and first definition data which represents said first cyclic number sequence; and

means for transferring the first data structure to a printer, said printer being brought to convert the first 20 data structure into a printable image.

30. Method, in a printer, for printing a coding pattern to code data on a surface, the coding pattern comprising a plurality of parallel number sequences which represent different rotations of a cyclic number sequence, said method comprising:

25 deriving shift information which designates a phase difference between each rotation and the cyclic number sequence;

retrieving definition data which represents said cyclic number sequence; and

30 generating a printable image of said coding pattern based on said shift information and said definition data.

31. A method of claim 30, wherein said definition data comprises an image definition which represents said 35 cyclic number sequence by at least one code block image.

32. An apparatus, in a printer, for printing a coding pattern to code data on a surface, the coding pattern

comprising a plurality of parallel number sequences which represent different rotations of a cyclic number sequence, said apparatus comprising:

5 means for deriving shift information which designates a phase difference between each rotation and the cyclic number sequence;

means for retrieving definition data which represents said cyclic number sequence; and

10 means for generating a printable image of said coding pattern based on said shift information and said definition data.

33. Method, in a printer, for printing a coding pattern to code data in a first dimension and a second dimension on a surface, the first dimension of the coding pattern comprising a plurality of first parallel number sequences, and the second dimension of the coding pattern comprising a plurality of second parallel number sequences, wherein each combination of one number value in the first number sequences and one number value in the second number sequences is represented by a unique code symbol in said coding pattern, said method comprising:

20 retrieving, for each number sequence in each dimension, at least one code block image of the code symbols that represent the number sequence;

25 merging the thus-retrieved code block images to form a first and a second composite image corresponding to said first dimension and said second dimension, respectively; and

30 combining said first and second composite images to form a printable image.

34. A method of claim 33, wherein each code block image represents each individual number of the associated number sequence by a graphic superposition of all code symbols that code the number value of said individual number.

35 35. A method of claim 34, wherein said step of combining comprises: aligning said first and second compos-

ite images; determining the AND logic values of mutually aligned image elements in said first and second composite images to obtain a two-dimensional matrix of AND logic values; and forming said printable image from said two-dimensional matrix.

36. A method of any one of claims 33-35, wherein said code block images are included in a font definition.

37. A method of any one of claims 33-36, which is effected at least partly under control of a page-describing code received by the printer.

38. A method of any one claims 37, wherein said page-describing code includes a image definition which defines said code block images.

39. A method of any one of claims 33-38, wherein the first and second number sequences represent different rotations of a first and a second cyclic number sequence, respectively, said method comprising the initial step of identifying the location of said rotations within the first and second dimensions of the coding pattern.

40. A method of claim 39, further comprising the step of deriving, for each dimension, shift information which designates a phase difference between each rotation and the cyclic number sequence; wherein said step of merging comprises, for each dimension: merging a plurality of identical code block images of the code symbols that represent the cyclic number sequence, said identical code block images being arranged with phase differences according to said shift information.

41. An apparatus, in a printer, for printing a coding pattern to code data in a first dimension and a second dimension on a surface, the first dimension of the coding pattern comprising a plurality of first parallel number sequences, and the second dimension of the coding pattern comprising a plurality of second parallel number sequences, wherein each combination of one number value in the first number sequences and one number value in the

second number sequences is represented by a unique code symbol in said coding pattern, said apparatus comprising:

means for retrieving, for each number sequence in each dimension, at least one code block image of the code
5 symbols that represent the number sequence;

means for merging the code block images to form a first and a second composite image corresponding to said first dimension and said second dimension, respectively; and

10 means for combining said first and second composite images to form a printable image.